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(54)	ENCAPSULATED FLAVOR AND FRAGRANCE			
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		512/4		
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### (57) ABSTRACT

The present invention provides solid complexes of urea and flavor and fragrance chemicals as well as methods of providing the complexes. The complexes are advantageously incorporated in powdered detergent and bleach products. The urea complexes protect the flavor or fragrance molecules from chemical reaction with other elements of the products. When added to water the urea complex is quickly removed from the flavor or fragrance molecule thereby delivering the material at the desired time.

17 Claims, No Drawings

<sup>\*</sup> cited by examiner

### ENCAPSULATED FLAVOR AND FRAGRANCE

### FIELD OF THE INVENTION

The present invention is related to flavor and fragrance molecules that are protected by a urea complex. The urea complex prevents the flavor and fragrance molecules from oxidation prior to being released at the desired time.

### BACKGROUND OF THE INVENTION

Flavor and fragrance molecules are often placed in environments that adversely effect the stability of the flavor or fragrance. For example, laundry bleaches contain oxidizing agents that can cause a fragrance to oxidize thereby diminishing the delivery of the fragrance at the desired time.

Various approaches have been tried to protect the flavor or fragrance such as encapsulation in various materials such as waxes or polymers. These approaches suffer from the drawback of additional cost of the encapsulating material, additional and costly processing to encapsulate the fragrance or flavor and the need to remove the encapsulating material in an inexpensive and easy manner.

A continuing need exists for a simple, inexpensive 25 method to protect flavor and fragrance materials prior to use, the coating being easily removed when desired.

### SUMMARY OF THE INVENTION

The present invention provides a solid complex compris- 30 ing:

a substantially linear flavor or fragrance molecule, the flavor or fragrance molecule having a backbone of at least 5 atoms in length; and

urea wherein the urea provides a protective complex <sup>35</sup> around the substantially linear flavor or fragrance molecule.

The present invention also provides a method for providing a flavor or fragrance molecule with a protective coating comprising:

providing urea in an amount sufficient to provide a protective coating;

providing a solvent;

providing a substantially linear flavor or fragrance molecule having a background of greater than or equally to five molecules;

admixing said urea, solvent and flavor or fragrance molecule;

removing said solvent and recovering said flavor or 50 fragrance molecule with protective urea coating.

These and other embodiments of the present invention will be described herein.

## DETAILED DESCRIPTION OF THE INVENTION

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The present invention is directed to a method for creating a protective urea barrier around a flavor or fragrance molecule. The urea forms a complex that protects the flavor or fragrance molecule. The present invention is well suited to 60 be used in powdered detergents since the flavor and fragrance molecules would be protected by the urea complex until it is placed into water, preferably warm water, which would release the fragrance from the urea complex and impart the fragrance to the clothes. In addition, the urea 65 complex protects the fragrance molecules from oxidizing agents in a detergent, such as bleach, prior to use.

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The flavor or fragrance compounds of the present invention are substantially linear, having a minimum chain length of greater or equal to five carbon atoms. More preferably the molecules have a minimum chain length of greater than or equal to five carbon atoms, more preferably greater than or equal to 8 carbon atoms. In the present invention, molecules having longer chain lengths are easily accommodated by the use of higher levels of urea. Shorter molecules, i.e., molecules of C<sub>2</sub>, C<sub>3</sub> and C<sub>4</sub> are not viable since these molecules are too short to be successfully complexed by urea. As used in throughout this specification, the term compound contemplates mixtures, combinations of two or more suitable molecules rather than a single material being encapsulated by urea.

The term substantially linear is understood to mean that the backbone does not contain any branches containing three or more atoms, other than hydrogen, off of the main backbone of the molecule. The backbone of the molecule may contain a ring, such as cyclopentane, cyclobutane, cyclohexane as well as aryl rings. The backbone of the molecule may also include epoxy bridges without deviating from the scope of the present invention. Preferably the molecules to be complexed with the urea do not contain any sidechains, however the present invention contemplates less than about 7, preferably less than about 6, preferably less than about 5 sidechains on the molecule. In highly preferred situations, there are fewer than about 4, preferably fewer than about 3 and most preferably fewer than about 2 sidechains on the molecule.

For purposes of explanation, the number of atoms in the backbone of the molecule is set forth in the following examples. As with conventional chemical naming techniques, the longest molecular chain is designated as the backbone. Atoms in the backbone include, but are not limited to, carbon, oxygen, nitrogen, silicon, phosphorous, sodium, potassium, calcium and the like. Hydrogen atoms are not counted among the atoms along the backbone. The sidechains are the atoms that are off of the backbone, i.e., are not part of the longest chain. The following molecules are within the scope of the present invention, the numbers indicting the length of the backbone of the molecule, as well as the length of any side chains:

(longest chain length of 9, one side chain of carbon)
phenyl-C—C—C—C

(the penyl ring provides at least one carbon atome of length)

(chain length of 7, 3side chains of 2)

1 2 3 4 5

C—C—C—OH

The oxygen molecule is counted among the atoms of the backbone and provides a chain length of 5 molecules.

(chain length of 8 atoms, the side chain of one atom, C)

This molecule has a side chain of two atoms. Longest chain is seven atoms including phenyl, at the one position and 2 carbons at the 3 position.

molecule substantially non-linear:

this molecule has a side chain of 3 carbons atoms.

Also not contemplated by the present invention are molecules having attached multiple ring groups, the ring groups can be carbon rings or heterocyclic rings. These attached urea. For clarity the molecules that contain multiple adjacent attached rings such as found in napthalene and anthracene are outside the scope of the present invention.

Olfactory effective amount is understood to mean the amount of compound in perfume compositions the individual component will contribute its particular olfactory characteristics, but the olfactory effect of the perfume composition will be the sum of the effects of each of the perfume or fragrance ingredients. Thus the compounds of the invention can be used to alter the aroma characteristics of the 45 perfume composition, or by modifying the olfactory reaction contributed by another ingredient in the composition. The amount will vary depending on many factors including other ingredients, their relative amounts and the effect that is desired.

Taste effective amount is understood to mean the amount of compound in compositions the individual component will contribute its particular taste characteristics, but the taste effect of the perfume composition will be the sum of the effects of each of the taste ingredients. Thus the compounds 55 of the invention can be used to alter the taste of the food, or by modifying the taste contributed by another ingredient in the composition. The amount will vary depending on many factors including other ingredients, their relative amounts and the effect that is desired.

The level of flavor or fragrance molecule complexed by urea varies from 0.01 to about 20 weight percent, preferably from about 0.1 to about 10 weight percent, more preferably from about 1.0 to about 5 weight percent of the total composition.

The flavor and fragrance molecules of the present invention are select from the group consisting of  $(C_5-C_{12})$  alkyl,

 $(C_5-C_{12})$ alkoxy, halo $(C_5-C_{12})$ alkyl, halo $(C_5-C_{12})$ alkoxy,  $(C_{5-C_{12}})$ alkenyl, halo $(C_5-C_{12})$ alkenyl,  $(C_5-C_{12})$ alkynyl, halo $(C_5-C_{12})$ alkynyl,  $(C_5-C_{12})$ alkoxy $(C_1-C_{12})$ alkyl,  $(C_5-C_{12})$ alkoxy $(C_2-C_{12})$ alkenyl,  $(C_1-C_{12})$ alkoxy $(C_2-C_{12})$ alkynyl,  $(C_2-C_{12})$ alkenyl $(C_1-C_{12})$ alkoxy,  $(C_2-C_{12})$ alkynyl  $(C_1-C_{12})$ alkoxy,  $(C_2-C_{12})$ alkynyl $(C_2-C_{12})$ alkenyl,  $(C_2-C_{12})$ alkenyl $(C_2-C_{12})$ alkynyl,  $(C_3-C_7)$ cycloalkyl, halo  $(C_3-C_7)$ cycloalkyl,  $(C_3-C_7)$ cycloalkyl $(C_1-C_{12})$ alkyl,  $(C_3-C_7)$ cycloalkyl $(C_2-C_{12})$ alkenyl,  $(C_3-C_7)$ cycloalkyl  $_{10}$  (C<sub>2</sub>-C<sub>12</sub>)alkynyl, (C<sub>1</sub>-C<sub>12</sub>)alkyl(C<sub>3</sub>-C<sub>7</sub>)cycloalkyl,  $(C_1-C_{12})$ alkoxy $(C_3-C_7)$ cycloalkyl,  $(C_2-C_{12})$ alkenyl  $(C_3-C_7)$ cycloalkyl,  $(C_2-C_{12})$ alkynyl $(C_3-C_7)$ cycloalkyl,  $halo(C_1-C_{12})alkyl(C_3-C_7)cycloalkyl, halo(C_1-C_{12})alkoxy$  $(C_3-C_7)$ cycloalkyl, halo $(C_2-C_{12})$ alkenyl $(C_3-C_7)$ cycloalkyl, halo( $C_2-C_{12}$ )alkynyl( $C_3-C_7$ )cycloallyl, halo( $C_3-C_7$ )alkenyl  $(C_3-C_7)$ cycloalkyl,  $(C_1-C_{12})$ alkoxy $(C_1-C_{12})$ alkyl $(C_3C_7)$ cycloalkyl, halo $(C_3-C_7)$ cycloalkyl $(C_3-C_7)$ cycloalkyl,  $(C_1-C_{12})$ alkoxy $(C_1-C_{12})$ alky $(C_3-C_7)$ cycloalky $(C_1-C_{12})$ alkoxy( $C_2-C_{12}$ )alkenyl( $C_3-C_7$ )cycloalkyl, ( $C_2-C_{12}$ )alkenyl present invention due to having side chains that render the  $\frac{1}{20}$  (C<sub>1</sub>-C<sub>12</sub>)alkoxy(C<sub>3</sub>-C<sub>7</sub>)cycloalkyl, (C<sub>1</sub>-C<sub>12</sub>)alkoxy  $(C_2-C_{12})$ alkynyl $(C_3-C_7)$ cycloalkyl,  $(C_2-C_{12})$ alkynyl  $(C_1-C_{12})$ alkoxy $(C_3-C_7)$ cycloalkyl,  $(C_2-C_{12})$ alkenyl  $(C_2-C_{12})$ alkynyl $(C_3-C_7)$ cycloalkyl,  $(C_2-C_{12})$ alkynyl  $(C_2-C_{12})$ alkenyl $(C_3-C_7)$ cycloalkyl,  $(C_3-C_7)$ cycloalkyl 25  $(C_3-C_7)$ cylcoalkyl,  $(C_1-C_{12})$ alkyl $(C_3-C_7)$ cycloalkyl  $(C_3-C_7)$ cycloalkyl,  $(C_2-C_{12})$ alkenyl $(C_3C_7)$ cycloalkyl  $(C_3-C_7)$ cycloalkyl,  $(C_2-C_{12})$ alkynyl $(C_3-C_7)$ cycloalkyl  $(C_3-C_7)$ cycloalkyl,  $(C_1-C_{12})$ alkoxy $(C_3-C_7)$ cycloalkyl  $(C_3-C_7)$ cycloalkyl,  $(C_3-C_7)$ cycloalkyl $(C_1-C_{12})$ alkyl  $_{30}$  (C<sub>3</sub>-C<sub>7</sub>)cycloalkyl, (C<sub>3</sub>-C<sub>7</sub>)cylcoalkyl(C<sub>2</sub>-C<sub>12</sub>)alkenyl  $(C_3-C_7)$ cycloalkyl,  $(C_3-C_7)$ cycloalkyl $(C_2-C_{12})$ alkynyl  $(C_3-C_7)$ cycloalkyl,  $(C_3-C_7)$ cycloalkyl $(C_1-C_{12})$ alkoxy  $(C_3-C_7)$ cycloalkyl,  $(C_3-C_7)$ cycloalkyl $(C_3-C_7)$ cycloalkyl  $(C_3-C_7)$ cycloalkyl,  $(C_3-C_7)$ cycloalkyl $(C_1-C_{12})$ alkenyl rings create make the rings too bulk for complexation with  $_{35}$  ( $C_3-C_7$ )cycloalkyl, ( $C_3-C_7$ )cycloalkyl( $C_1-C_{12}$ )alkoxy  $(C_2-C_{12})$ alkynyl $(C_3-C_7)$ cycloalkyl, aryl, aralkyl, aryl  $(C_1-C_{12})$ alkoxy, aryl $(C_2-C_{12})$ alkenyl, aryl $(C_2-C_{12})$ alkynyl,  $aryl(C_3-C_7)cycloalkyl$ ,  $aryloxy(C_1-C_{12})alkyl$ , aryloxy $(C_2-C_{12})$ alkynyl, aryloxy $(C_2-C_{12})$ alkenyl, aryl $(C_1-C_{12})$ alkoxy( $C_3-C_7$ )cycloalkyl, aryl( $C_2-C_{12}$ )alkenyl( $C_3-C_7$ ) cycloalkyl,  $aryl(C_2-C_{12})alkynyl(C_3-C_7)cycloalkyl, aryl$  $(C_3-C_7)$ cycloalkyl $(C_3-C_7)$ cycloalkyl,  $(C_3-C_7)$ cycloalkylaryl,  $aryl(C_1-C_4)alkyl(C_3-C_7)cycloalkyl$ , heterocyclic, aryl( $C_1-C_4$ )alkylheterocyclic, aryl( $C_2-C_4$ ) alkenylheterocyclic, aryl( $C_2-C_4$ )alkynylheterocyclic, heterocyclic(C<sub>1</sub>-C<sub>4</sub>)alkyl, and heterocyclic(C<sub>3</sub>-C<sub>7</sub>) cycloalkyl,  $(C_1-C_6)$ alkylphosphinyl,  $(C_{-C_6})$ alkylphosphonyl,  $(C_1-C_6)$ alkylphosphonate,  $(C_1-C_6)$ alkylphosphite.

> The term "alkyl" includes both branched and straight chain alkyl groups from 5 to 12 carbon atoms. Typical alkyl groups are n-pentyl, isopentyl, n-hexyl, n-heptyl, n-octyl, isooctyl, nonyl, decyl, undecyl, dodecyl, n-hexadecyl, n-tetracosyl, n-octacyosanyl and the like. Also included are alkyls with a branch in the chain. For example, those with skill in the art will recognize that there are numerous variations that are possible with any materials listed in this application. For example, included in the present invention are heptanes ( $C_7H_{16}$ ) which include the following molecules 60 n-heptane, 2-methylhexane, 3-methylhexane, 2,2dimethylpentane, 2,3-dimethylpentane, 2,4dimethylpentane, 3,3dimethylpentane 3-ethylpentane, 2,2,3trimethylbutane. The term "haloalkyl" refers to a straight or branched alkyl group substituted with 1 to 3 halogens.

The term "alkoxy" includes both branched and straight chain alkyl groups from 1 to 12 carbon atoms containing at least one oxygen atom. Typical alkoxy groups are n-pentoxy,

isopentoxy, n-hexoxy, n-heptoxy and the like. The term "haloalkoxy" refers to an alkoxy group substituted with 1 to 3 halogens.

The term "alkenyl" refers to an ethylenically unsaturated hydrocarbon group, straight or branched, having a chain 5 length of 5 to 12 carbon atoms and 1 to 2 ethylenic bonds. The term "haloalkenyl" refers to an alkenyl group substituted with 1 to 3 halogen atoms.

The term "alkynyl" refers to an unsaturated hydrocarbon group, straight or branched, having a chain length of 5 to 12 carbon atoms and 1 to 2 acetylenic bonds. The term "halokynyl" refers to an alkynyl group substituted with 1 to 3 halogens.

The term "cycloalkyl" refers to a saturated ring system having 3 to 7 carbon atoms.

The term "aryl" includes phenyl or napthyl, which may be substituted with up to three substituents independently selected from the group consisting of halogen, cyano, nitro, phenyl, phenoxy,  $(C_1-C_6)$ alkyl,  $(C_1-C_4)$ alkylthio,  $(C_1-C_4)$  alkylsulfoxide,  $(C_1-C_6)$ alkoxy, and halo  $(C_1-C_4)$  alkyl.

Typical aryl substituents include, but are not limited to, 4-chlorophenyl, 4-fluorophenyl, 4-bromophenyl, 2-methoxyphenyl, 2-methylphenyl, 3-methylphenyl, 4-methylphenyl, 2,4-dibromophenyl, 3,5-difluorophenyl, 2,5 2,4,6-trichlorophenyl, 4-methoxyphenyl, 2-chloronapthyl, 2,4-dimethoxyphenyl, 4-(trifluoromethyl)phenyl and 2-iodo-4-methylphenyl.

The term "heterocyclic" refers to a substituted or unsubstituted 5 to 6 membered unsaturated ring containing one, 30 two or three heteroatoms, preferably one or two heteroatoms independently selected from oxygen, nitrogen and sulfur, or to a bicyclic unsaturated ring system containing up to 10 atoms including one heteroatom selected from oxygen, nitrogen and sulfur. Examples of heterocycles include, but 35 are not limited to, 2-, 3-, or 4-pyridinyl, pyrazinyl, 2-, 4-, or 5-pyrimidinyl, pyridazinyl, triazolyl, imidazolyl, 2- or 3-thienyl, 2- or 3-furyl, pyrrolyl, oxazolyl, isoxazolyl, thiazolyl, isothiazolyl, oxadiazolyl, thiadiazolyl, quinolyl and isoquinolyl. The heterocyclic ring may be optionally 40 substituted with up to two substituents independently selected from  $(C_1-C_2)$  alkyl, halogen, cyano, nitro and trihalomethyl.

The term "aralkyl" is used to describe a group wherein the alkyl chain is from 1 to 10 carbon atoms and can be branched 45 or straight chain, preferably a straight chain, with the arylportion, as defined above, forming a terminal portion of the aralkyl moiety. Typical aralkyl moieties are optionally substituted benzyl, phenethyl, phenpropyl and phenbutyl moieties. Typical benzyl moieties are 2-chlorobenzyl, 50 3-chlorobenzyl, 4-chlorobenzyl, 2-fluorobenzyl, 3-fluorobenzyl, 4-fluorobenzyl, 4-trifluoromethylbenzyl, 2,4dichlorobenzyl, 2,4-dibromobenzyl, 2-methylbenzyl, 3-methylbenzyl and 4-methylbenzyl. Typical phenethyl moieties are 2-(chlorophenyl)ethyl, 2-(3-chlorophenyl) 55 ethyl, 2-(4-chlorophenyl)ethyl, 2-(2-fluorophenyl)ethyl, 2-(3-fluorophenyl)ethyl, 2-(4-fluorophenyl)ethyl, 2-(2methylphenyl)ethyl, 2-(3-phenyl)ethyl, 2-(4-methylphenyl) 2-(4-trifluoromethylphenyl)ethyl, 2-(2methoxyphenyl)ethyl, 2-(3-methoxyphenyl)ethyl, 2-(4- 60 methoxyphenyl)ethyl, 2-(2,4-dichlorophenyl)ethyl, 2-(3,5methoxyphenyl)ethyl. Typical phenpropyl moieties are 3-phenylpropyl, 3-(2-chlorophenyl)propyl, 3-(3chlorophenyl)propyl, 3-(4-chlorophenyl)propyl, 3-(2,4dichlorophenyl)propyl, 3-(2-fluorophenyl)propyl, 3-(3-65) fluorophenyl)propyl, 3-(4-fluorophenyl)propyl, 3(2methylphenyl)propyl, 3-(3-methylphenyl)propyl, 3-(46

methylphenyl)ethyl, 3-(2-methoxyphenyl)propyl, 3-(3-methoxyphenyl)propyl, 3-(4-methoxyphenyl)propyl, 3-(4-trifluoromethylphenyl)propyl, 3-(2,4-dichlorophenyl)propyl and 3-3,5dimethoxyphenyl) propyl.

Typical phenbutyl moieties include 4-phenylbutyl, 4-(2-chlorophenyl)butyl, 4-(3-chlorophenyl)butyl, 4-(4-chlorophenyl)butyl, 4-(2-fluorophenyl)butyl, 4-(3-fluorophenyl) butyl, 4-(4-fluorophenyl) butyl, 4-(2-methylphenyl)butyl, 4-(3-methylphenyl)butyl, 4-(4-methylphenyl)butyl, 4-(2,4-dichlorophenyl)butyl, 4-(2-methoxyphenyl)butyl, 4-(3-methoxyphenyl)butyl, and 4-(4-methoxyphenyl) butyl.

Halogen or halo is meant to include iodo, fluoro, bromo and chloro moieties.

Preferably the molecules encapsulated by urea are linear such as n-octanol, n-dodecanol and the like. The present invention contemplates some branching off of the main backbone. Various atoms may be contained in the flavor or fragrance molecules of the present invention. In addition to hydrocarbons containing carbon and hydrogen, molecules of the present invention may also include other atoms, including but not limited to oxygen, nitrogen, phosphorus and sulfur. The molecules include without limitation, alcohols, esters, aldehydes, acids and hydrocarbons.

The following materials are commercially available fragrance materials available from International Flavors & Fragrances Inc., Hazlet, N.J. Suitable alcohols include, but are not limited to:

### NAME

10-Undecen-1-ol
Alpha-n-Amyl Cinnamyl Alcohol
1-Octen-3-ol
Para-Methoxy Benzyl Alcohol
Alpha-3,3-Trimethyl Cyclohexane1-Methanol
Para-Isopropyl Cyclohexanol
2-Ethyl-4-(2,2,3-Triethyl-3-Cyclopenten-1-yl-2-Buten-1-ol
3,7-Dimethyl-6-Octen-1-ol
Phenoxy Acetaldehyde
Para-Cymen-7-ol
3,7-Dimethyl-6-Octen-3-ol
3,7-Dimethyl-1-Octanol
2-Methyl-4-Phenyl-2-Butanol

2,4-Dimethyl-3-Cyclohexene-1-Methanol
3,7-Dimethyl-2,6-Octadien-1-ol
O,m,p-Methyl Phenyl Ethanol
3-Hexen-1-ol
Beta-Methyl Phenyl Ethyl Alcohol

3,7-Dimethyl-1,7-Octanediol
Alpha-Isobutyl Phenethyl Alcohol
3,4,5,6,6-Pentamethyl-2-Heptanol
2,6,-Dimethyl Heptan-6-ol
2,6-Dimethyl-7-Octen-2-ol
5-(2,6,6-Triethyl-2-Cyclohexen-1-yl)-4-Penten-3-one
3-Methyl-4-2,6,6-Trimethyl-1Cyclohexen-1-yl)-3-Buten-2-one
2,6-Dimethyl-3,5-Octadien-2-ol
2-Methyl-6-Methylene-7-Octen-2-ol
3,7-Dimethyl-2,6-Octadien-1-ol

2,6-Dimethyl-5,7-Octadien-2-ol alpha,alpha-4-Trimethyl Benzene Ethanol

4-Tertiary Butyl Cyclohexanol
3-Methyl-5-Phenyl-1-Petntanol

### COMMON NAME

ALCOHOL C-11 UNDECYLENIC AMYL CINNAMIC ALCOHOL AMYL VINYL CARBINOL ANISIC ALCOHOL APHERMATE

APO PATCHONE BACDANOL

CITRONELLOL COEUR
CORTEX ALDEHYDE
CUMINYL ALCOHOL
DIHYDRO LINALOOL
DIMETHYL OCTANOL
DIMETHYL PHENYL ETHYL
CARBINOL
FLORALOL

GERANIOL ABSOLUTE
HAWTHANOL
HEXENOL
HYDRATROPIC ALCOHOL
COEUR
HYDROXYOL
ISOBUTYL BENZYL CARBINOL
KOHINOOL
LOLITOL
LYMOLENE
ALPHA METYYL IONONE

DELTA METHYL IONONE

MUGUOL MYRCENOL

NEROL
OCIMENOL
PARA METHYL DIMETHYL
BENZYL CARBINOL
PATCHONE
PHENOXANOL

-CO	ntinued	ı	-co	ntinued
NAME	COMMON NAME		NAME	COMMON NAME
2-Benzyl-M-Dioxan-5-ol	PHENYL ACETALDEHYDE GLYCERINE ACETAL	5	2,4-Dimethyl-3-Cyclohexene-1- 3,5,5-Trimethyl Hexanal	TRIPLAL VANDOR B
2-Phenyl Ethyl Alcohol 3-Methyl-1-Phenyl-3-Pentanol	PHENYL ETHYL ALCOHOL PHENYL ETHYL METHYL ETHYL CARBINOL		Para-Methyl Phenoxy Acetaldehyde	XI ALDEHYDE
3,7-Dimethyl-6-Octen-1-ol	RHODINOL COEUR	10		
9-Decen-1-ol alpha,lpha-4-Trixnethyl-3-Cyclo- hexene-1-Methanol	ROSALVA ALPHA TERPINEOL	10	· · · · · · · · · · · · · · · · · · ·	cially available as a fragrance,
3,7-Dimethyl-3-Octanol	TETRAHYDRO LINALOOL		include but are not limited	to:
2,6-Dimethyl-2-Octanol 2-Tertiary-Butyl Cyclohexanol	TETRAHYDRO MYRCENOL VERDOL			
		15	NAME	COMMON NAME
Suitable aldehydes included fragrance, but are not limited.	le, commercially available as a ed to:		2-Methoxy-4-Propenyl-1)-Phenyl Acetate	ACETYL ISOEUGENOL
		20	2-Pentyloxy-Allyl Ester Glycolic Acid	ALLYL AMYL GLYCOLATE
NI A N AID			Allyl-n-Hexanoate	ALLYL CAPROATE ALLYL CYCLOHEXYL
NAME	COMMON NAME	ı	3-Cyclohexyl Propionic Acid, Allyl Ester	PROPIONATE
1-Octanal	ALDEHYDE C-8		Propionate-9-Decen-1-ol	AMBRONATE
1-Nonanal 1-Decanal	ALDEHYDE C-9 ALDEHYDE C-10		Isoamyl-n-Butyrate Alpha-n-Amyl Cinnamyl Acetate	AMYL BUTYRATE AMYL CINNAMIC ACETATE
2-Methyl Decanal	ALDEHYDE C-10 ALDEHYDE C-11 MOA	25	Phenyl Acetic Acid, Isoamyl Ester	
10-Undecen-1-al	ALDEHYDE C-11 UNDECYLENIC		Isoamyl Propionate	AMYL PROPIONATE
1-Undecanal 1-Dodecanal	ALDEHYDE C-11 UNDECYLIC ALDEHYDE C-12 LAURIC		Pentyl Ortho Hydroxy Benzoate 2(3)-Methyl Butanoic-1-Acid:2(3)-	AMYL SALICYLATE AMYL VALERATE
2-Methyl Undecanal Methyl Nonyl Acetaldehyde	ALDEHYDE C-12 MNA		Methyl Butyl-1-Ester 1-Octen-3-yl Acetate	AMYL VINYL CARBINYL
alpha-n-Amylcinnamic Alcohol	AMYL CINNAMIC ALDEHYDE	30	1 Octon 5 yr rectate	ACETATE
Coeur	COEUR		3-Phenyl-3-Buten-1-yl Acetate	ANISIMAL
3,7-Dimethyl-2-Methylene-6- Octenal	BERGAMAL		Para-Methoxy Benzyl Acetate Benzyl-n-Butanoate	ANISYL ACETATE BENZYL-n-BUTYRATE
2-Methyl-3-(para-Methoxy Phenyl)Propanal	CANTHOXAL		Formic Acid Benzyl Ester Benzyl-3-Methyl Butyrate	BENZYL FORMATE BENZYL ISOVALERATE
3,7-Dimethyl-2,6-Octadien-1-al	CITRAL DIMETURA ACETAI	35	Benzyl-n-Propanoate	BENZYL PROPIONATE
3,7-Dimethyl-2,6-Octadienal Dimethyl Acetal	CITRAL DIMETHYL ACETAL		Benzyl ortho Hydroxy Benzoate 3-Phenyl-2-Propen-1-yl Acetate	BENZYL SALICYLATE CINNAMYL ACETATE
3,7-Dimethyl-6-Octen-1-al 3,7-Dimethyl-6-Octenyl Methyl	CITRONELLAL CITRONELLYL METHYL		3,7-Dimethyl-6-Octen-1-yl Acetate 3,7-Dimethyl-6-Octen-1-yl	
Acetal 2-Heptyl-1,3-Dioxolane Octanal	ACETAL CYCLOCTAL	40	Propionate 2-Tertiary Pentyl Cyclohexanyl	CONIFERAN
Glycol Acetal Para-Ethyl-alpha,alpha-Dimethyl	FLORALOZONE		Acetate Para-Cymen-7-yl Acetate	CUMINYL ACETATE
Hydrocinnamaldehyde			Cyclohexanethanyl Acetate	CYCLOHEXYLETHYL ACETATE
5,9-Dimethyl-4,8-Decadienal 6,10-Dimethyl-3-oxa-5,9-	GERALDEHYDE PEONY ALDEHYDE		6-Methyl-3-Isopropenyl Cyclo- hexanyl Acetate	DIHYDRO CARVYL ACETATE
Undecadien-1-al	I LONI ALDEITIDE		Cyclohexane Methanol, 2,4-	DIHYDRO FLORALATE
-	HEXYL CINNAMIC ALDERYDE	45	Dimethyl Acetate	
m-Cymene-7-Carboxaldhyde Ethyl Phenethyl Acetal	HOMOCUMINIC ALDERYDE 50 HYACINTH BODY		2,6-Dimethyl-7-Octen-2-yl Acetate alpha,alpha-Dimethyl Phenethyl	DIHYDRO MYRCENYL ACETATE DIMETHYL BENZYL CARBINYL
Acetaldehyde			Acetate	ACETATE
Phenethyl Propyl Acetal	HYACINTH BODY NO. 31		alpha, alpha-Dimethyl Phenethyl	DIMETHYL BENZYL CARBINYL
Acetaldehyde Alpha-Methyl Phenylacetaldehyde	HYDRATROPIC ALDERYDE	50	Butyrate alpha, alpha - Dimethyl Phenethyl	BUTYRATE DIMETHYL BENZYL CARBINYL
7-Hydroxy-3,7-Dimethyl Octanal	HYDROXYCITRONELLAL		Isobutyrate	ISOBUTYRATE
10-Undecenal	INTRELEVEN ALDEHYDE		alpha, alpha-Dimethyl Phenethyl	DIMETHYL BENZYL CARBINYL
Ethyl-cis-3-Hexenyl Acetal Acetaldehyde	LEAF ACETAL EXTRA		Propionate 3,7-Dimethyl-1-Octanyl Acetate	PROPIONATE DIMETHYL OCTANYL ACETATE
3,7-Dimethyl-2,6-Octadien-1-al	LEMSYN		2-Methyl-4-Phenyl-2-Butyl Acetate	DIMETHYL PHENYL ETHYL
4-(4-Hydroxy-4-Methyl Pentyl)-3-	LYRAL	55	2 Mothad 4 Dhonad 2 Dutad	CARBINYL ACETATE
Cyclohexene-1-Carboxaldehyde 2-Methyl-3-Phenyl-2-Propen-1-al	ALPHA-METHYL CINNAMIC		2-Methyl-4-Phenyl-2-Butyl Isobutyrate	DIMETHYL PHENYL ETHYL CARBINYL ISOBUTYRATE
2-Methyl Octanal	ALDEHYDE METHYL HEXYL		Ethyl-3-Hydroxy Butyrate n-Butyric Acid Ethyl Ester	ETHOXIFF ETHYL BUTYRATE
	ACETALDEHYDE		n-Hexanoic Acid Ethyl Ester	ETHYL CAPROATE
3,7-Dimethyl-6-Octenyl-oxy-Acetaldehyde	MUGUET ALDEHYDE 50	60	3,7-Dimethyl-6-Octenyl Ethyl Ester Oxalic Acid	ETHYL CITRONELLYL OXALATE
4-(4-Methyl-3-Pentenyl)-3-Cyclo-	MYRAC ALDEHYDE		Isovaleric Acid Ethyl Ester	ETHYL ISOVALERATE
hexene-1-Carboxaldehyde Alpha-Methyl-4-(1-Methyl	PARA ISOPROPYL		3-Methyl-3-Phenyl Glycidic Acid Ethyl Ester	ETHYL METHYL PHENYL GLYCIDATE
Benzene Acetaldehyde	HYDRATROPIC ALDEHYDE		2-Methoxy Benzoic Acid Ethyl	ETHYL ORTHO METHOXY
Dihydro Cinnamic Acetate	PHENYL PROPYL ACETATE		Ester	BENZOATE

Ester

BENZOATE

ETHYL-3-PHENYL GLYCIDATE

3-Phenyl Glycidic Ethyl Ester ETHYL-3-PHENYL GL 4-Allyl-2-Methoxy Phenol Acetate EUGENYL ACETATE

Dihydro Cinnamic Acetate
1-Methyl-4-(4-Methyl-3-Pentenyl)3-Cyclohexene-1-Carboxaldehyde

PHENYL PROPYL ACETATE

NAME	COMMON NAME
4-Allyl-2-Methoxy Phenyl Phenol Acetate	EUGENYL PHENYL ACETATE
2,4-Dimethyl-3-Cyclohexene-1- Methanyl Acetate	FLORALATE
Ethyl-2,4-Dimethyl-1,3-Dioxolane-	FRAISTONE
2-Acetate Ethyl-2-Methyl-1,3-Dioxolane-2-	FRUCTONE
Acetate	
Ethyl-2-Hexyl Acetoacetate 3,7-Dimethyl-2,6-Octadien-1-yl	GELSONE GERANYL ACETATE
Acetate	GERANYL BUTYRATE
3,7-Dimethyl-2,6-Octadien-1-yl- Butyrate	OERANTE DOTTRATE
3,7-Dimethyl-2,6-Octadien-1-yl Formate	GERANYL FORMATE
3,7-Dimethyl-2,6-Octadien-1-yl	GERANYL ISOBUTRATE
Isobutyrate 3,7-Dimethyl-2,6-Octadien-1-yl	GERANYL PROPIONATE
Propionate Isobutyric Acid,2,4-Hexadienyl	HEXADIENYL ISOBUTYRATE
Ester	
n-Hexyl Acetate n-Hexyl-ortho-Hydroxy Benzoate	HEXYL ACETATE n-HEXYL SALICYLATE
BETA-Methyl Phenethyl Alcohol	HYDRATROPYL ACETATE
Acetate 2-Furanpropionic Acid, Isobutyl	ISOBUTYL FURYL PROPIONATE
Ester Phenyl Acetic Acid, Isobutyl	ISOBUTYL PHENYL ACETATE
Ester	
2H-Pyran-4-ol, Tetrahydro-3- Pentyl Acetate	JASMAL
2H-Pyran-4-ol, 3-Butyltetrahydro-	JASMELIA
S-Methyl Acetate 2H-Pyran-4-ol, 3-Butyltetrahydro-	JESSEMAL
5-Methyl Acetate Ethyl-3-Hydroxy-3-Phenyl	LABDANAX
Propionate	
Cis-3-Hexenyl Methyl Carbonate  Anthranillic Acid, Methyl Ester	LIFFAROME METHYL ANTHRANILATE
10-Undecenoic Acid, Methyl Ester	METHYL UNDECYLENATE MYRCENYL ACETATE
V-Octen-2-ol, 2-Methyl-6- Methylene Acetate	WIRCENILACEIAIE
2,6-Octadien-1-ol, 3,7-Dimethyl Formate	NERGER FORMATE
2,6-Octadien-1-ol, 3,7-Dimethyl	NERYL ACETATE
Acetate Nonyl Alcohol Acetate	NONYL ACETATE
2-Norpinene-2-Ethanol, 6,6-	NOPYL ACETATE
Dimethyl Acetate 5,7-Octadien-2-ol, 2,6-Dimethyl	OCIMENYL ACETATE
Acetate Lauric Acid Ethyl Ester	OENANTHIC ETHER
Octanoic Acid, p-Tolyl Ester	PARA CRESYL CAPRYLATE
sobutyric Acid, p-Tolyl Ester 4-Methyl Benzene Methanol	PARA CRESYL ISOBUTYRATE PARA METHYL BENZYL
Acetate	ACETATE
2-Phenoxyethyl Isobutyrate	PHENOXY ETHYL ISOBUTYRATE
2-Phenoxyethyl Propionate	PHENOXYETHYL PROPIONATE
2-Phenyl Ethyl Acetate 2-Phenyl Ethyl Benzoate	PHENYL ETHYL ACETATE PHENYL ETHYL BENZOATE
Beta-Phenyl Ethyl n-Butyrate	PHENYL ETHYL n-BUTYRATE
Cinnamic Acid, Phenethyl Ester	PHENYL ETHYL CINNAMATE
Phenethyl Alcohol Formate	PHENYL ETHYL FORMATE
Beta-Phenyl Ethyl Isobutyrate	PHENYL ETHYL ISOBUTYRATE
3-Pentanol, 3-Methyl-1-Phenyl	PHENYL ETHYL METHYL
Acetate  Beta-Phenyl Ethyl Phenyl Acetate	ETHYL CARBINYL ACETATE PHENYL ETHYL PHENYL
John Thomas Edityr Filellyr Acetate	ACETATE
	ACLIAIL

PHENYL ETHYL PROPIONATE

PHENYL ETHYL SALICYLATE

PHENYL PROPYL PROPIONATE

PHENYL PROPYL ACETATE

PHENYL ACETATE

PROFLORA

6-Octen-1-ol-3,7-Dimethyl Acetate RHODINYL ACETATE

Beta-Phenyl Ethyl Propionate

Beta-Phenyl Ethyl Salicylate

Dihydro Cinnamic Propionate

2-Buten-1-ol-3-Methyl Acetate

2-Buten-1-ol-3-Methyl Benzoate

Dihydro Cinnamic Acetate

	NAME	COMMON NAME
	6-Octen-1-ol-3,7-Dimethyl	RHODINYL BUTYRATE
	Butyrate	
	6-Octen-1-ol-3,7-Dimethyl	RHODINYL FORMATE
	Formate	
	6-Octen-1-ol-3,7-Dimethyl	RHODINYL ISOBUTYRATE
	Isobutyrate	
l	Cyclohexane-1-Methanol, alpha,	ROSAMUSK
	3,3-Trimethyl Acetate	D C CE ATTE
	9-Decen-1-yl Acetate	ROSEATE
	Methyl Phenyl Carbinyl Acetate	STYRALYL ACETATE
	Methyl Phenyl Carbinyl Propionate	
	3-Cyclohexene-1-Methanol, alpha,	TERPINYL ACETATE
	alpha, 4-Trimethyl Acetate	
	3-Octanol, 3,7-Dimethyl-2-	TETRAHYDRO MUGYL
	Octanol, 2,6-Dimethyl Acetate	ACETATE
	3,55-Trimethyl Hexyl Acetate	VANORIS
	3,6-Dimethyl-beta-Resorcyclic	VERAMOSS
	Acid Methyl Ester 2-Tertiary-Butyl-Cyclohexanyl	VERDOX
	Acetate	VERDOA
	Cis-3-Hexenyl Acetate	VERDURAL EXTRA
	Cis-3-Hexen-1-yl Isobutyrate	VERDURAL B EXTRA
	Para-Tertiary-Butyl-Cyclohexyl	VERTENEX
	Acetate	
	2-Methyl Butyl Salicylate	ISOAMYL SALICYLATE
	n-Amyl Salicylate	PENTYL SALICYLATE

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-continued

Suitable ketones include, commercially available as a fragrance, but are not limited to:

NAME	COMMON NAME
Para-Methoxy Acetophenone	ACETANISOLE

	Para-Methoxy Acetophenone	ACETANISOLE
35	2-n-Heptyl Cyclopentanone	FLEURAMONE
	Allyl alpha-Ionone	HEXALON
	4-(2,6,6-Trimethyl-1-Cyclohexen-1-	IONONE
	yl)-3-Buten-2-one	
	2,3,6-Trimethyl Cyclohexen-4-yl-1-	METHYL CYCLO CITRONE
	Methyl Ketone	
40	4-(2,4,6-Trimethyl-4-Cyclohexen-1-	IRITONE
40	yl)3-Buten-2-one	
	3-Methyl-4-(2,6,6-Trimethyl-2-	GAMMA METHYL IONONE A
	Cyclohexen-1-yl)-3-Buten-2-one	
	5-(2,6,6-Trimethyl-2-Cyclohexen-1-	n-METHYL IONONE
	yl)-4-Buten-3-one	
	3-(HydroxyMethyl)-2-Nonanone	METHYL LAVENDER KETONE
45	4-Tertiary Pentyl-Cyclohexanone	ORIVONE
	4-(para-Hydroxy Phenyl)-2-Butanone	OXYPHENYLON
	4-(1,1-Dimethylethyl)-Cyclo-	PARA TERTIARY BUTYL
	hexanone	CYCLOHEXANONE
	Gamma-Undecalactone	PEACH ALDEHYDE COEUR

Other suitable materials include, commercially available

VERDONE

	as a fragrance, but are not limited to:	
<i></i>		

Ortho-Tertiary-Butyl-Cyclohexanone

	NAME	COMMON NAME
	Para-Methoxy-alpha-Phenyl Propene	ANETHOLE
60	Methyl, N-3,7-Dimethyl-7- Hydroxy Octylidene	AURALVA
	Anthinilate 1-Benzyloxy-2-Methoxy-4- Propenyl Benzene	BENZYL ISOEUGENOL
	3,7-Dimethyl-2,6-Octadiene- 1-Nitrile	CITRALVA
65	3,7-Dimethyl-6-Octenenitrile	CITRONALVA CITRONAMA

### -continued

NAME	COMMON NAME
2-Hexyl-1,3-Dioxolane	CITROTONE B
n-Dodecane Nitrile	CLONAL
5-Phenyl-5-Methyl-3-	4-DAMASCOL
Hexanone	
n-Decyl Vinyl Ether	DECAVE
n-Decanyl Methyl Ether	DECYL METHYL ETHER
di-n-Butyl Sulfide	DIBUTYL SULFIDE
6-Methyl-2-[4-(4-Methyl-	DIMYRCENE
3-Pentenyl)-3-Cyclohexen-1-	
yl]-1,5-Heptadiene	
Methyl-n-Hexyl Ether	DIOLA
4-Allyl-2-Methoxy Phenol	EUGENOL
3,7-Dimethyl-2,6-Octadien-	GERANYL ETHYL ETHER
1-Ethoxy	
2-(1-Phenylethyl)-1,3-	HYDRATROPIC ALDEHYDE
Dioxolane	CYCLOGLYCOL ACETAL
7-Hydroxy-3,7-Dimethyl,	HYDROXYCITRONELLAL DIMETHYL
Dimethyl Acetal Octanol	ACETAL
Acetyl Diisoamylene	KOAVONE
p-Mentha-1,8-Diene	D-LIMONENE
4-(4,8-Dimethyl-3,7-	MARITIMA
Nonadienyl) Pyridine	
Methyl Phenethyl Ether	METHYL PHENYL ETHYL ETHER
3,7-Dimethyl-1,3,6-Octatriene	OCIMENE
1,1-Dimethoxy Octane	OCTACETAL
p-Menth-1-en-8-yl Methyl	ORANGE FLOWER ETHER
Ether	
Cyclohexyl Phenethyl Ether	PHENAFLEUR
2-Methyl-2-Pentenoic Acid	STRAWBERIFF
Cycloglycol Acetal-2-Ethyl Hexanal	SYVERTAL

In addition to fragrance materials, the present invention is also useful to provide a urea complex around materials used as flavors. Suitable favors include but are not limited to the following materials, also commercially available from International Flavors and Fragrances Inc. The flavors include, citronellal, 1,3,5-undecatriene, methyl nonyl acetaldehyde, citronellol, iso-propyl hexate, hexyl iso-pentanoate, octyl formate, cis-6 nonenal, gamma-methyl-gamma-n-hexyl butyrolactone, n-hexanol, ethyl caprylate, ethyl decylate, heptaldehyde glyceral acetal, cis-4-decenal, tetrahydro 40 linalool, gamma decalatone, hexenal, hexanal, methyl-namyl ketone, dodecalactone, massoia lactone, 2-decenal, 4-methyl octanoic acid, 4-methyl-nonanoic acid, capric acid, furfuryl octanoate, DITHALFAROME-705, DITHALFAROME-702, 3-methyl-thio-1-hexanol, octyl 45 butyrate, cis-6-nonenal, dipropyl ketone, 2-ethyl-2octenoate, capryl alcohol, undecyclic C11 aldehyde, ethyl-2,4-decadienoate, 2ethyl hexanoic acid, 3-hexenyl hexate, 2-heptanol, di-iso-butyl ketone, 2-octen-4-one, 2-butyl-2butenal, octanal, heptanoic acid, 2-octenal, ethyl butyl 50 ketone, amyl vinyl carbinol, citronello, AMARYLLIDE, delta-undecalactone, OXAROME-722, methyl-2nonenoate, C-18 aldebyde, Peach ALDEHYDE COEUR, gamma dodecalactow, C-12 aldehyde, C-10 aldehyde, para cresyl caprylate, 2,4-decadienal, heptyl acetate, citronellyl 55 formate, methyl caprylate, methyl nonyl ketone, glyceral acetal heptaldehyde, 2-nonenal, 2,4-undecadienal, methyl undecyl ketone, delta tetradecalactone, ethyl-3-hydroxy hexanoate, cis-6-nonenal, methyl heptyl ketone, ethyl amyl ketone, n-butyl caproate, acetyl n-butyryl, diethyl sebacate, 60 lauric alcohol, methyl hexyl ketone, 3-hexanone, octyl alcohol, phenyl ethyl octanoate, methyl nonylate, rhodinyl acetate, ethyl palmitate, allyl caproate, hexyl butyrate, nonyl acetate, ethyl caproate, ethyl heptoate, linoleic acid, methyl laurate, 2,4-decadienal, ethyl myristate, hexyl propyl 65 rioonate, 2-ethyl hexanol, linoleic acid, methyl hexyl acetaldehyde, iso propyl myristate, n-undecane, n-tridecane,

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n-pentadecane, n-hexadecane, n-heptadecane, phenyl ethyl hexate, JESSAMAL COER, hexyl cinnarnic aldehyde, methyl heptylate, hexyl caproate, C-10 alcohol, oenathic ether, C-9 aldehyde, C-8 aldehyde, C-7 alcohol, decanyl acetate, methyl nonylenate, amyl caproate, ethyl-2-4decadienoate, methyl heptin carbonate, hexenyl caproate, ethyl-2-octenoate, ethyl undecanoate, methyl octin carbonate, C-6 acetaldehyde, 2-octenal, FLEXOL, caproic acid, n-hexyl-2-methyl butyrate, INTRELEVEN alcohol, C-12 acetaldehyde, allyl caprylate, 3,4-hexanedione, allyl heptoate, iso-butyl caproate, octyl phenyl acetate, BUTTER DERIVED ACIDS, amyl caprylate, ethyl stearate, C-9 alcohol, pelargonic acid, ALDO MO, n-hexyl isobutyrate, 15 caprylic acid, methyl myristate, RHODINYL butyrate, RHODINYL isobutyrate, 2-decenal, trans4-decenoic acid, lauric acid, amyl caproate, EMPLEX PATCO, hexyl caprylate, methyl caproate, beta, gamma hexenyl formate, MIGLYOL-812 DYNAMIT, 2,4-undecadienal, 1-al-2-20 tridecene, ORRIS aldehyde, acetyl-isovaleryl, VEGACID 1520, cis4-decenal, ethyl oleate, ethyl-24-decadienoate, n-heptyl-isobutyrate, amyl caprylate, octyl isobutyrate, FRUCTOSE A.I.D, magnesium stearate, 2-nonenal, BIOTIN, Vitamin A palmitate.

The molecules that are encapsulated in the present invention can contain double and triple bonds. Those with skill in the art will appreciate that double bonds within the molecules create various isomers. While complexation of both cis and trans isomers are contemplated by the present invention, trans isomers are preferred in the use of the invention.

The present invention is advantageously used in environments where higher pH conditions are found, pHs such as detergents. Additionally problematic with detergents materials is the inclusion of oxidizing agents such as bleach, which cause fragrance materials to prematurely oxidize thereby reducing or eliminating the fragrance.

The urea is complexed by first dissolving in a suitable solvent. Alcohol can be used to dissolve the urea, with methanol being preferred. After the urea is dissolved in the solvent, the dissolution enhanced by heating of the solvent, the flavor or fragrance molecule is added to solution. The molecule, urea and solvent mixture is allowed to cool to room temperature and the solid material containing the urea/molecule is filtered off. If a solid material is not obtained, cooling means is employed such as packing he reactor contents in ice. In an alternative embodiment of the invention the solvent can be evaporated, providing the urea/molecule complex as a residue.

Once the solid material is obtained, the particle size of the complex can be obtained by grinding techniques that are well known in the art, such as hammermill, cryogenic grinding and the like. The present invention allows the flavor/fragrance urea complex to be of similar size to the detergent or bleach compounds that it is incorporated into.

In the present invention a complexation amount of urea is provided to encapsulate the molecule. The amount of urea required will depend on the length of the molecule to be complexed in the urea. Generally, the level of urea required is at least about 5 moles of urea per mole of fragrance or flavor for each atom in the backbone of the molecule. More preferably about 6 to about 10 moles of urea are used, most preferably from about 6.5 to about 9.0 moles of urea per molecule in the backbone of the molecule.

The present invention provides several advantages, including the instant release of the flavor or fragrance molecule from the urea complex upon addition to an aqueous environment. This feature makes the present invention well suited for use in powdered materials including cleaning products such as detergents, bleaches, fabric softeners and other materials that are routinely added to water. Other applications of the invention include air fresheners, bathroom deodorizers, and the like wherein exposure to moisture in the atmosphere will remove the urea thereby releasing the fragrance. In addition, the present invention can be used to protect flavors that are incorporated in powdered drinks that are added to water, or items that are to be swallowed wherein the moisture in the mouth and digestive system will release the material.

In addition, urea is a common, inexpensive material and the complexation of urea with the flavor and fragrance molecules is easily processed once added to water.

The following examples are provided as specific embodiments of the present invention. Other modifications of the invention will be readily apparent to those skilled in the art without departing from the scope or spirit of the invention. As used herein all percentages are weight percent unless otherwise noted and g is understood to be grams.

### **EXAMPLE** 1

### Aldehyde/Urea Inclusion Complex

A three liter reaction flask equipped with a reflux condenser, additional funnel was charged with urea (400 g, 6.67 moles) and 1800 grams of methanol. The urea/methanol mixture was heated to reflux to dissolve the urea in the methanol. The heat was removed and ulenic aldehyde 35 (90 g/0.54 moles) was charged to the reactor. The contents of the reactor were allowed to cool to room temperature providing a precipitate. The precipitate material was then filtered and dried providing a urea/ulenic aldehyde complex.

### EXAMPLE 2

The efficacy of urea complexed materials was tested in a laundry detergent. The following samples were prepared which contained percarbonate.

The following materials were prepared using a standard detergent base to simulate a commercially available laundry detergent. Samples were prepared using  $C_{12}$  lauric aldehyde,  $C_{11}$  undecyclic aldehyde, as well as urea inclusion complexes of  $C_{12}$  lauric aldebyde,  $C_{11}$  undecyclic aldehyde.

The complexes contained 22% raw material ( $C_{12}$  lauric aldehyde,  $C_{11}$  undecyclic aldehyde). The samples included the following:

Detergent base plus 0.2% aldehyde  $C_{12}$ 

Detergent base plus 0.2% aldehyde  $C_{12}$  urea complex

Detergent base plus 0.2% aldehyde  $C_{11}$ 

Detergent base plus 0.2% aldehyde C<sub>11</sub> urea complex

The samples were stored at 5° C., room temperature and 60 at 37° C. and 70% relative humidity. After two and four weeks of storage, the detergents were used in standard wash tests conducted using 40° C. and 60° C. with the samples stored at 37° C. A full washload (2.8 kilograms) was washed with 80 grams of detergent powder placed inside the washing machine. The samples were tested for their odor after being placed in water.

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The following results were obtained:

Storage			Sample and Results		
	Time	Temperature	C <sub>12</sub> v C <sub>12</sub> complex	C <sub>11</sub> v C <sub>11</sub> complex	
	2 weeks	40° C.	No difference noted	C <sub>11</sub> complex performed better	
.0		60° C.	C <sub>12</sub> complex performed better	No difference noted	
	4 weeks	40° C.	C <sub>12</sub> complex performed better	C <sub>11</sub> complex performed better	
		60° C.	C <sub>12</sub> complex performed better	C <sub>11</sub> complex performed better	

All of the complexed materials performed at least as well as the aldehyde materials. A more significant fragrance was noted with the samples stored for four weeks, especially with the  $C_{11}$  complex washed at 60° C.

What is claimed is:

- 1. A solid complex consisting of:
- a substantially linear flavor or fragrance molecule, the flavor or fragrance molecule having a backbone of at least 5 atoms in length;

solvent; and

urea wherein the urea provides a protective complex around the substantially linear flavor or fragrance molecule.

- 2. A solid complex consisting of:
- a substantially linear flavor or fragrance molecule, the flavor or fragrance molecule having a backbone of at least 5 atoms in length; and
- urea wherein the urea provides a protective complex around the substantially linear flavor or fragrance molecule.
- 3. The solid complex of claim 1 or 2 wherein the urea is provided in an amount of greater than or equal to 5 moles of urea per mole of fragrance or flavor for each atom in the backbone of the flavor or fragrance molecule.
- 4. The solid complex of claim 1 or 2 wherein the substantially linear flavor or fragrance molecule is selected from the group consisting of aldehyde, ketone and acid.
- the group consisting of aldehyde, ketone and acid. 5. The solid complex of claim 1 or 2 wherein the flavor or fragrance is selected from the group consisting of 1-octanal, 1-nonanal, 1-decanal, 2-methyl decanal, 10-undecen-1-al, 45 1-undecanal, 1-dodecanal, 2-methyl undecanal methyl nonyl acetaldehyde, alpha-n-amylcinnamic alcohol coeur, 3,7dimethyl-2-methylene-6-octenal, 2-methyl-3-(paramethoxy phenyl)-propanal, 3,7-dimethyl-2,6-octadien-1-al, 3,7-dimethyl-2,6-octadienal dimethyl acetal, 3,7-dimethyl-50 6-octen-1-al, 3,7-dimethyl-6-octenyl methyl acetal, 2-heptyl-1,3-dioxolane octanal glycol acetal, para-ethylalpha, alpha-dimethyl hydrocinnamaldehyde, 5,9-dimethyl-4,8-decadienal, 6,10-dimethyl-3-oxa-5,9-undecadien-1-al, alpha-n-hexyl cinnamic aldehyde, m-cymene-7-55 carboxaldehyde, ethyl phenethyl acetal acetaldehyde, phenethyl propyl acetal acetaldehyde, alpha-methyl phenylacetaldehyde, 7-hydroxy-3,7-dimethyl octanal, 10-undecenal, ethyl-cis-3-hexenyl acetal acetaldehyde, 3,7dimethyl-2,6-octadien-1-al, 4-(4-hydroxy-4-methyl pentyl)-3-cyclohexene-1-carboxaldehyde, 2-methyl-3-phenyl-2propen-1-al, 2-methyl octanal, 3,7-dimethyl-6-octenyl-oxyacetaldehyde, 4-(4-methyl-3-pentenyl)-3-cyclohexene-1carboxaldehyde, alpha-methyl-4- (1-methyl benzene acetaldehyde, dihydro cinnamic acetate, 1-methyl-4-(4methyl-3-pentenyl)-3-cyclohexene-1-carboxaldehyde, 2,4dimethyl-3-cyclohexene-1-carboxaldehyde, 3,5,5-trimethyl hexanal, and para-methyl phenoxy acetaldehyde.

6. The solid complex of claim 1 or 2 wherein the flavor or fragrance is selected from the group consisting of paramethoxy acetophenone, 2-n-heptyl cyclopentanone, allyl alpha-ionone, 4-(2,6,6-trimethyl-1-cyclohexen-1-yl)-3-buten-2-one, 2,3,6-trimethyl cyclohexen-4-yl-1-methyl 5 ketone, 4-(2,4,6-trimethyl-4-cyclohexen-1-yl)3-buten-2-one, 3-methyl-4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-3-buten-2-one, 5-(2,6,6-trimethyl-2-cyclohexen-1-yl)-4-buten-3-one, 3-(hydroxymethyl)-2-nonanone, 4-tertiary pentyl-cyclohexanone, 4-(para-hydroxy phenyl)-2- 10 butanone, 4-(1,1-dimethylethyl)-cyclohexanone, gamma-undecalactone, and ortho-tertiary-butyl-cyclohexanone.

7. The solid complex of claim 1 or 2 wherein the flavor or fragrance is selected from the group consisting of 2-methoxy-4-(propenyl-1)-phenyl acetate, 2-pentyloxy-allyl 15 ester glycolic acid, allyl-n-hexanoate, 3-cyclohexyl propionic acid, allyl ester, propionate-9-decen-1-ol, isoamyl-nbutyrate, alpha-n-amyl cinnamyl acetate, phenyl acetic acid, isoamyl ester, isoamyl propionate, pentyl ortho hydroxy benzoate, 2(3)-methyl butanoic-1-acid, 2(3)-methyl butyl- 20 1-ester, 1-octen-3-yl acetate, 3-phenyl-3-buten-1-yl acetate, para-methoxy benzyl acetate, benzyl-n-butanoate, formic acid benzyl ester, benzyl-3-methyl butyrate, benzyl-npropanoate, benzyl ortho hydroxy benzoate, 3-phenyl-2propen-1-yl acetate, 3,7-dimethyl-6-octen-1-yl acetate, 3,7-25 dimethyl-6-octen-1-yl propionate, 2-tertiary pentyl cyclohexanyl acetate, para-cymen-7-yl acetate, cyclohexanethanyl acetate, 6-methyl-3-isopropenyl cyclohexanyl acetate, cyclohexane methanol, 2,4-dimethyl acetate, 2,6dimethyl-7-octen-2-yl acetate, alpha, alpha-dimethyl phen- 30 ethyl acetate, alpha, alpha-dimethyl phenethyl butyrate, alpha, alpha-dimethyl phenethyl isobutyrate, alpha, alphadimethyl phenethyl propionate, 3,7-dimethyl-1-octanyl acetate, 2-methyl-4-phenyl-2-butyl acetate, 2-methyl-4phenyl-2-butyl isobutyrate, ethyl-3-hydroxy butyrate, 35 n-butyric acid ethyl ester, n-hexanoic acid ethyl ester, 3,7dimethyl-6-octenyl ethyl ester oxalic acid, isovaleric acid ethyl ester, 3-methyl-3-phenyl glycidic acid ethyl ester, 2-methoxy benzoic acid ethyl ester, 3-phenyl glycidic ethyl ester, 4-allyl-2-methoxy phenol acetate, 4-allyl-2-methoxy 40 phenyl phenol acetate, 2,4-dimethyl-3-cyclohexene-1methanyl acetate, ethyl-2,4-dimethyl-1,3-dioxolane-2acetate, ethyl-2-methyl-1,3-dioxolane-2-acetate, ethyl-2hexyl acetoacetate, 3,7-dimethyl-2,6-octadien-1-yl acetate, 3,7-dimethyl-2,6-octadien-1-yl-butyrate, 3,7-dimethyl-2,6- 45 octadien-1-yl formate, 3,7-dimethyl-2,6-octadien-1-yl isobutyrate, 3,7-dimethyl-2,6-octadien-1-yl propionate, isobutyric acid, 2,4-hexadienyl ester, n-hexyl acetate, n-hexyl-ortho-hydroxy benzoate, beta-methyl phenethyl alcohol acetate, 2-furanpropionic acid, isobutyl ester, phenyl 50 acetic acid, 2H-pyran-1-ol, tetrahydro-3-pentyl acetate, 3-butyltetrahydro-5-methyl acetate, ethyl-3-hydroxy-3phenyl propionate, cis-3-hexenyl methyl carbonate, anthranillic acid, methyl ester, 10-undecenoic acid, 7-octen-2-ol, 2-methyl-6-methylene acetate, 2,6-octadien-1-ol, 3,7- 55 dimethyl formate, 3,7-dimethyl acetate, nonyl alcohol acetate, 2-norpinene-2-ethanol, 6,6-dimethyl acetate, 5,7octadien-2-ol, 2,6-dimethyl acetate, lauric acid ethyl ester, octanoic acid, p-tolyl ester, 4-methyl benzene methanol acetate, 2-phenoxyethyl isobutyrate, 2-phenoxyethyl 60 propionate, 2-phenyl ethyl acetate, 2-phenyl ethyl benzoate, beta-phenyl ethyl n-butyrate, cinnamic acid, phenethyl ester, phenethyl alcohol formate, beta-phenyl ethyl isobutyrate, 3-pentanol, 3-methyl-1-phenyl acetate, beta-phenyl ethyl phenyl acetate, beta-phenyl ethyl propionate, beta-phenyl 65 ethyl salicylate, dihydro cinnamic acetate, dihydro cinnamic propionate, 2-buten-1-ol-3-methyl acetate, 2-buten-1-ol-3**16** 

methyl benzoate, 6-octen-1-ol-3,7-dimethyl acetate, 6-octen-1-ol-3,7-dimethyl butyrate, 6-octen-1-ol-3,7-dimethyl formate, 6-octen-1-ol-3,7-dimethyl isobutyrate, cyclohexane-1-methanol, alpha, 3,3-trimethyl acetate, 9-decen-1-yl acetate, methyl phenyl carbinyl propionate, 3-cyclohexene-1-methanol, alpha, alpha, 4-trimethyl acetate, 3-octanol, 3,7-dimethyl-2-octanol, 2,6-dimethyl acetate, 3,5,5-trimethyl hexyl acetate, 3,6-dimethyl-beta-resorcyclic acid methyl ester, 2-tertiary-butyl-cyclohexanyl acetate, cis-3-hexenyl acetate, cis-3-hexen-1-yl isobutyrate, para-tertiary-butyl-cyclohexyl acetate, 2-methyl butyl salicylate, and n-amyl salicylate.

8. The solid complex of claim 1 or 2 wherein the flavor or fragrance molecule is selected from the group consisting of 10-undecen-1-ol, alpha-n-amyl cinnamyl alcohol, 1-octen-3-ol, para-methoxy benzyl alcohol, alpha-3,3-trimethyl cyclohexane-1-methanol, para-isopropyl cyclohexanol, 2-ethyl-4-(2,2,3-trimethyl-3-cyclopenten-1-yl)-2-buten-1ol, 3,7-dimethyl-6-octen-1-ol, phenoxy acetaldehyde, paracymen-7-ol, 3,7-dimethyl-6-octen-3-ol, 3,7-dimethyl-1octanol, 2-methyl-4-phenyl-2-butanol, 2,4-dimethyl-3cyclohexene-1-methanol, 3,7-dimethyl-2,6-octadien-1-ol, o,m,p-methyl phenyl ethanol, 3-hexen-1-ol, beta-methyl phenyl ethyl alcohol, 3,7-dimethyl-1,7-octanediol, alphaisobutyl phenethyl alcohol, 3,4,5,6,6-pentamethyl-2heptanol, 2,6-dimethyl heptan-6-ol, 2,6-dimethyl-7-octen-2ol, 5-(2,6,6-trimethyl-2-cyclohexen-1-yl)-4-penten-3-one, 3-methyl-4-(2,6,6-trimethyl-1-cyclohexen-1-yl)-3-buten-2one, 2,6-dimethyl-3,5-octadien-2-ol, 2-methyl-6-methylene-7-octen-2-ol, 3,7-dimethyl-2,6-octadien-1-ol, 2,6-dimethyl-5,7-octadien-2-ol, alpha, alpha-4-trimethyl benzene ethanol, 4-tertiary butyl cyclohexanol, 3-methyl-5-phenyl-1pentanol, 2-benzyl-m-dioxan-5-ol, 2-phenyl ethyl alcohol, 3-methyl-1-phenyl-3-pentanol, 3,7-dimethyl-6-octen-1-ol, 9-decen-1-ol, alpha, alpha-4-trimethyl-3-cyclohexene-1methanol, 3,7-dimethyl-3-octanol, 2,6-dimethyl-2-octanol, and 2-tertiary-butyl cyclohexanol.

9. A laundry product that contains the solid complex of claim 1 or 2.

10. A solid food product that contains the solid complex of claim 1 or 2.

11. A solid cleaning product that contains the solid complex of claim 1 or 2.

12. A solid cleaning product consisting essentially of:

a substantially linear flavor or fragrance molecule, the flavor or fragrance molecule having a backbone of at least 5 atoms in length;

urea wherein the urea provides a protective complex around the substantially linear flavor or fragrance molecule; and

further contains an oxidizing agent.

13. A method for providing a flavor or fragrance molecule with a protective coating comprising:

providing urea in an amount sufficient to provide a protective coating;

providing a solvent;

providing a substantially linear flavor or fragrance molecule having a backbone of greater than or equally to five atoms;

admixing said urea, solvent and flavor or fragrance molecule;

removing said solvent and recovering said flavor or fragrance molecule with protective urea coating.

- 14. The method of claim 13 wherein the flavor or fragrance molecule with the protective urea coating is recovered by filtration.
- 15. The method of claim 13 wherein the flavor or fragrance molecule with the protective urea coating is recov-5 ered by distillation.

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- 16. The process of claim 13 wherein the solvent is an alcohol.
- 17. The process of claim 16 wherein the alcohol is methanol.

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